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Retail Computing Scales - Are You Able to Detect a Noncompliant Pricing Feature?

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A number of variations exist in the manner in which pricing information is entered and displayed on retail computing scales. WMD frequently receives inquiries regarding the legal requirements applicable to various pricing capabilities existing on retail computing scales. This article is intended to identify and describe the significant differences in some common pricing capabilities and explain the legal requirements to be applied. It is hoped that this information will assist in distinguishing pricing features that comply with legal requirements from those that do not.

Verifying Accurate Price Computation

An important part of the inspection of any retail computing device is verifying that the device computes accurately and within legal requirements. General Code, Paragraph G.S.5.5. requires all digital money value indications and recorded representations on a retail computing device to be in mathematical agreement with their associated quantity representations or indications to the nearest cent.

G-S.5.5. Money Values, Mathematical Agreement. - Any recorded money value and any digital money-value indication on a computing-type weighing or measuring device used in retail trade shall be in mathematical agreement with its associated quantity representation or indication to the nearest 1 cent of money value. This does not apply to auxiliary digital indications intended for the operator's use only, when these indications are obtained from existing analog customer indications that meet this requirement.

(Amended 1973)

To verify whether or not a device is compliant with G-S.5.5., it is first necessary to complete a sales transaction. To complete a sales transaction, apply a load to the platform of the scale, enter any unit price desired, and observe the digital money-value indication that is displayed. Next, using a calculator or pencil and paper, multiply the quantity value that is displayed on the scale by the unit price that was entered. To be compliant, the resulting product must agree with the displayed money value indication to the nearest cent. If the scale is equipped with a printer, print a label and verify whether or not the sales information recorded on the label conforms to this requirement.



Figure 1

For example, assume that a load indicating a quantity value of 1.06 lb has been added to the load-receiving element of a retail-computing scale, a unit price of \$2.98 per pound has been entered, and the scale computes a total sale price of \$3.16. Figure 1 above shows examples of a scale display and printed receipt for this transaction. To verify whether the scale complies with G-S.5.5., multiply 1.06 lb by \$2.98. The resulting product of multiplying these two values together is \$3.1588. When rounded to the nearest cent, \$3.1588 becomes \$3.16. To be compliant with G-S.5.5., the scale must indicate and record (if equipped with a printer) a total money value of \$3.16 for this particular sales transaction. If any other value were displayed or recorded as the total money value, the device would fail to comply.

Fractional Unit Pricing

"Fractional unit pricing" is not permitted on retail computing scales used in direct sale applications. The term "fractional unit pricing," when used to describe an operational pricing feature on a retail computing scale, simply means that the scale is capable of accepting unit price entries that are in fractions of a single whole unit of weight and computing total sale prices based on fractional prices that are entered. For example, a scale with fractional unit pricing capability might accept a fractional unit price entry of \$1.00 per one-half pound and display the following sales information to a customer who requested a pound of bologna at a delicatessen:



Figure 2

For this transaction, the unit price per pound is actually \$2.00/lb. A retail computing scale equipped with fractional unit pricing capability does not comply with NIST Handbook 44 Scales Code, Paragraph S.1.8.3. because this paragraph requires unit prices visible to a customer to be in terms of single whole units and not in common or decimal fractions of the unit. Note from the example that an enunciator light and appropriate marking is provided to indicate to the customer when the price being observed is being computed at ½ or ¼ pound. Despite the presence of this descriptive marking, the scale still would not comply with the provisions of S.1.8.3. because the unit price displayed (i.e., the \$ price/lb) to the customer is on the basis of a fraction of a pound (e.g., ½ lb) and not on the basis of a whole unit of weight.

S.1.8.3. Customer's Indications. - Weight indications shall be shown on the customer's side of computing scales when these are used for direct sales to retail customers. Computing scales equipped on the operator's side with digital indications, such as the net weight, unit price, or total price, shall be similarly equipped on the customer's side. Unit price displays visible to the customer shall be in terms of single whole units of weight and not in common or decimal fractions of the unit. Scales indicating in metric units may indicate price per 100 g.

(Amended 1985 and 1995)

Multiplying Feature

Some devices are equipped with a multiplying feature. A multiplying feature automatically changes the value of any unit price entered by a factor equal to the marked value of the input device that the scale operator used to activate the multiplying feature. As the unit price changes with the activation of the multiplying feature, the scale automatically computes and displays to the customer a new total sale price that is based upon the value of the new unit price. For example, if a multiplying key marked "½" or "2X" were activated following a unit price entry of \$2.00 per pound, the unit price would increase from \$2.00 per pound to \$4.00 per pound, whereas, if a multiplying key marked "¼" or "4X" were activated, the unit price would increase from \$2.00 per pound to \$8.00 per pound. A new total sales price would then be computed and displayed to the customer based on the new unit price. Figure 3 illustrates the change in the information displayed to a customer before and after the activation of a multiplying key marked "½" or "2X."

1.00 lb	Quantity	1.00 lb	Quantity
1.00	\$ Price/lb	2.00	\$ Price/lb
1.00	\$ Total Sale	2.00	\$ Total Sale

Before Activation of a Multiplying Key Marked "½" or "2X"
After Activation of a Multiplying Key Marked "½" or "2X"

Figure 3. Example of the Information Displayed on the Customer Side of a Retail-Computing Scale

A multiplying feature generally complies with the provisions of Scales Code, Paragraph S.1.8.3. because unit price displays visible to the customer before and during activation of the feature are typically in terms of single whole units of weight. Yet the operational keys, pushbuttons, or other data input devices used to activate a multiplying feature will often be marked very similar to or the same as the data input devices present for activating fractional unit pricing on a noncompliant scale. In addition to having similar operational markings, scale operators may also follow the same or very similar procedures when entering unit prices to complete sales transactions on scales equipped with either of these pricing features.

Fractional unit pricing capability vs. legal pricing feature(s)

Many retail computing scales are equipped with keys, pushbuttons, or other data input devices that are marked to suggest the existence of fractional unit pricing capability when in fact these input devices perform some other legal pricing function. Determining whether or not a retail computing scale is equipped with fractional unit pricing capability is not difficult. There are a few obvious clues that should alert attention to the possibility that a scale may be equipped with this feature. It is important to be aware, however, that just because there is evidence to suggest a scale is equipped with fractional unit pricing capability, whether or not a pricing feature actually allows the entry of unit prices in fractional units can only be confirmed by testing.

One obvious indication that a scale may be equipped with fractional unit pricing capability is the existence of operational keys, pushbuttons, switches, or other data input devices that are marked with a fractional value such as " $\frac{1}{2}$ " or " $\frac{1}{4}$." Even keys marked in a manner to suggest they perform a multiplying function, such as "2X" or "4X" may actually perform a fractional pricing function and, therefore, need to be verified. Another obvious clue is the existence of markings found on a scale showing an indication that pricing is in fractional units as shown in Figure 2. In some cases these markings may be part of the live scale display and may not be visible until a fractional unit price has been entered. In other cases they may be visibly apparent at all times.

The existence of fractional unit pricing capability on a scale is not always obvious. Some retail computing scales may be equipped with fractional unit pricing capability activated by hidden keys, pushbuttons, or other types of input devices or by input devices that are easily identifiable as such, yet, bear no marking whatsoever to indicate their operational control.

Verifying Conformance of Pricing Features

All operational keys, pushbuttons, switches, or other data input devices that are marked with a fractional number or marked to suggest they perform a multiplying function should be activated during an official examination to determine their effect. For example, to determine the effect of a key marked " $\frac{1}{2}$," apply a load to the scale platter and enter a unit price either manually or with a Price Look Up (PLU) code. Press the " $\frac{1}{2}$ " key and observe the effect this action has on the scale. Be especially alert for changes in the displayed unit price and total price when this key is pressed. One of the following three scenarios is likely to occur when a key marked " $\frac{1}{2}$ " is pressed:

Scenario 1: If the scale is equipped with a fractional unit pricing feature that has not been disabled, the quantity indication and the unit price that was initially entered will remain constant. However, the money value indication representing the total sales price will double in value. Note the change in the displayed customer information before and after activation of a fractional unit pricing feature in the example shown below. Notice that before the fractional unit pricing feature is activated, the unit price value displayed to the customer is in whole units. However, after activation, the unit price displayed to the customer (as indicated by the " $\frac{1}{2}$ " light and the total price computation) is on the basis

of a fraction of a whole unit (i.e., price per half pound) and, consequently, does not comply with Scales Code, Paragraph S.1.8.3.

1.00 lb	Quantity	- ½
1.00	\$ Price/lb	- ¼
1.00	\$ Total Sale	

Before Activation of a Fractional Unit Pricing Feature

1.00 lb	Quantity	- ½
1.00	\$ Price/lb	- ¼
2.00	\$ Total Sale	

After Activation of a Fractional Unit Pricing Feature

Figure 4. Example of the Information Displayed on the Customer Side of a Retail-Computing Scale

Scenario 2: If the key functions as a multiplier, the quantity value indication will remain constant and the unit price and the money value indication representing the total sales price will both multiply (in this case, double) in value. Since unit prices displayed to the customer remain in whole units following the activation of a multiplying feature, this feature complies with Handbook 44 requirements.

1.00 lb	Quantity	
1.00	\$ Price/lb	
1.00	\$ Total Sale	

Before Activation of a 2X Multiplying Feature

1.00 lb	Quantity	
2.00	\$ Price/lb	
2.00	\$ Total Sale	

After Activation of a 2X Multiplying Feature

Figure 5. Example of the Information Displayed on the Customer Side of a Retail-Computing Scale

Scenario 3: If the key has been disabled, there will be no change observed. Oftentimes, scale manufacturers or service technicians will disable an otherwise operational fractional unit pricing feature because the feature fails to comply with Handbook 44 requirements. This is considered an acceptable practice providing there is also an approved means of providing security to enable officials to monitor future changes that might be made to this feature.

During the inspection of a retail computing scale, it is also important for officials to look for unmarked or hidden keys, pushbuttons, switches, and other types of operational controls or features. When discovered, such controls and features should be carefully inspected as they too may be capable of activating a fractional unit pricing feature or some other noncompliant operational feature.

For additional information regarding the legal requirements applicable to fractional unit pricing on retail computing scales, contact Rick Harshman at (301) 975-8107 or by email at richard.harshman@nist.gov.